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ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.*

(54) Title: METHODS AND PRODUCTS FOR TREATING STAPHYLOCOCCAL INFECTIONS

(57) Abstract: The invention relates to nucleic acid sequences and related compositions for producing over-expression of the polysaccharide PNAG of *Staphylococci*. PNAG may be isolated and formulated into vaccines or used to generate antibodies. Binding agents of the nucleic acids are also described. The invention also relates to diagnostic and therapeutic methods using the compositions.

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/36371

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C12N 09/00, 01/20, 15/09; C07H 21/04

US CL : 435/183, 252.3, 320.1; 536/23.2

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : ENTER

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
CAS STN, WEST, commercial nucleotide databases, Pubmed Medline

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	McKenney et al. Infect Immun. 1998 Oct;66(10):4711-20.	1-17 and 34-41
Y	Kuroda et al. Lancet. 2001 Apr 21;357(9264):1225-40.	1-17 and 34-41
Y	Gotz F. Mol Microbiol. 2002 Mar;43(6):1367-78.	1-17 and 34-41
Y	Conlon et al. J Bacteriol. 2002 Aug;184(16):4400-8.	1-17 and 34-41

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

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# INTERNATIONAL SEARCH REPORT

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## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.: 1-17 and 34-41
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

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### BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Invention 1 Claim(s) 1-17, drawn to a method of making a polysaccharide over-producing bacterium comprising introducing into a bacterium an ica nucleic acid operably linked to an ica regulatory nucleic acid.

Invention 2 Claim(s) 18-26, drawn to a method of making a polysaccharide over-producing bacterium comprising recombinantly down-regulating wild-type IcaR protein production.

Invention 3 Claim(s) 27-33, drawn to a method of making a polysaccharide over-producing bacterium comprising recombinantly altering the TATT nucleotide sequence in the ica promoter region.

Invention 4 Claim(s) 34-41, drawn to a recombinant polysaccharide over-producing bacterium comprising an ica nucleic acid operably linked to an ica regulatory nucleic acid.

Invention 5 Claim(s) 42-48, drawn to a recombinant polysaccharide over-producing bacterium comprising a mutant icaR nucleic acid.

Invention 6 Claim(s) 49-52, drawn to a method of producing a bacterial polysaccharide.

Invention 7 Claim(s) 53-62, drawn to a method of producing an antibody to a bacterial polysaccharide.

Invention 8 Claim(s) 63-72, drawn to an isolated nucleic acid molecule.

Invention 9 Claim(s) 73-83, drawn to a method for identifying an isolated binding agent.

Invention 10 Claim(s), 84-89 drawn to a method for identifying an ica promoter sequence associated with polysaccharide overproduction.

Invention 11 Claim(s), 90-95 drawn to a method for identifying an ica regulatory nucleic acid molecule that enhances polysaccharide production.

Invention 12 Claim(s), 96-106 drawn to a composition comprising an isolated agent that binds to a nucleic acid.

Invention 13 Claim(s) 107-115, 124, 133, drawn to a method of over-producing a protein in a bacterium comprising introducing into a bacterium an ica nucleic acid operably linked to an ica regulatory nucleic acid.

Invention 14 Claim(s), 116-133 drawn to a method of over-producing a protein in a bacterium comprising introducing into a bacterium an ica nucleic acid operably linked to an ica regulatory nucleic acid, wherein the ica regulatory nucleic acid comprises a mutant icaR nucleic acid.

The inventions listed as Groups 1-14 do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:  
The same or corresponding technical feature shared by Inventions 1-14 is a nucleic acid molecule which hybridizes under stringent conditions to a nucleic acid molecule having a sequence of SEQ ID NO: 2, have an addition, deletion or substitution in a region between and including nucleotides 9 and 43 of SEQ ID NO: 2. However, this technical feature has already been taught in the prior art by Kuroda et al. (Accession BA000018; Lancet 357 (9264), 1225-1240 (2001)).

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Kuroda et al. teach a nucleic acid having a sequence of SEQ ID NO: 2, have an addition, deletion or substitution in a region between and including nucleotides 9 and 43 of SEQ ID NO: 2 (see alignment). Thus, the same or corresponding technical feature shared by Inventions 1-14 is not special since it was known in the prior art and therefore cannot make a contribution over the prior art.